

ABSTRACT OF THE DISCLOSURE

A system and method for calculating a deadlock-free set of paths in a network which generates an ordered set of deadlock-free sub-topologies, referred to as "layers." The ordered set of layers is used to determine a deadlock-free set of paths through the network. The resulting paths allow data to be efficiently routed through the network without causing traffic to be disproportionately routed through any subset of links. Each of the deadlock-free layers may be any type of deadlock-free sub-topology. The generated ordering may be any arbitrary ordering of the layers. A shortest-path route calculation is performed with the following constraint: starting at any given layer, for each node, proceed to calculate a shortest path to every other node in the graph where at any node being utilized to assess a given minimum path, the path may move to any higher-ordered layer, but may never return to a lower ordered layer. In this way, within each layer, a path moves through a tree and thus avoids deadlock. Between layers, a path may move only in a single direction, thus also avoiding deadlock.

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